# Evaluating relative impacts of habitat loss and invasive species on an endemic songbird species to guide sustainable management decisions

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## Background/Questions/Methods

Island ecosystems support greater endemic biodiversity such that changes in unique and limited habitat can have dramatic impacts on small, isolated wildlife populations. These enhanced sensitivities add to the challenge of identifying opportunities and mechanisms for implementing sustainable land use practices. Within Puerto Rico, agricultural landscapes and ecosystems that provide habitat for endemic fauna contribute to ecotourism revenue in addition to supporting wildlife conservation. Forest composition has changed as areas are developed for urban and residential use, cleared for agricultural purposes, or reforested, altering habitat availability for local fauna, including songbirds. Here we explore possible impacts of changes to habitat connectivity and interspecific interactions on the viability of the endemic Puerto Rican vireo (*Vireo latimeri*). This case study illustrates options for improving sustainable management decisions. Initial species distributions were determined by the Puerto Rico GAP analysis project. Maps of subsequent land cover change were used to simulate loss and gain of breeding habitat and to project potential changes in habitat availability in the future. We used the spatially-explicit, individual-based population modeling tool HexSim and previously estimated vital rates to determine relative population-level impacts of brood parasitism, predation, and habitat loss on vireo population growth and distribution in various simulated scenarios.

## Results/Conclusions

We observed the greatest vireo population declines where habitats were highly fragmented and with combined predation and parasitism. Overall species distribution was reduced in regions with multiple stressors, primarily by habitat loss. The anticipated reductions in reproductive success and home range included in the models were representative of a single species, but these results provide proof of concept for analysis of additional species or communities of concern. Sensitivity analyses of simulated scenarios contribute to evaluation of costs and benefits associated with agricultural, urban, and protected areas. These tradeoffs inform decisions about sustainable land use based on local and regional conservation priorities identified by managers and stakeholders.